ABSTRACT OF THE DISCLOSURE

A parity assignment technique enables parity declustering in a large, balanced parity ("super-stripe") array of a storage system. The balanced array may be constructed by combining a plurality of unbalanced parity stripe arrays, each having parity blocks on a set of storage devices, such as disks, that are disjoint from the set of disks storing the data blocks. The technique distributes the assignment of disks to parity groups among the combined super-stripe array such that all disks contain the same amount of data or parity information. Moreover, the technique ensures that all surviving data disks of the array are loaded uniformly during a reconstruction phase after a single or double disk failure.